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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/588,333

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Jurgen Mosler

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EXAMINER

NGUYEN, HUY TRAM

ART UNIT

PAPER NUMBER

1797

NOTIFICATION DATE

DELIVERY MODE

07/17/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/588,333	<b>Applicant(s)</b> MOSLER ET AL.	
	<b>Examiner</b> HUY-TRAM NGUYEN	<b>Art Unit</b> 1797	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 June 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 32-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 32-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____.                                     |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/20/06, 3/21/07, 5/13/08, 2/18/09</u> .                     | 6) <input type="checkbox"/> Other: _____.                         |



## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
2. Claims 32 and 57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claims 33 and 57 recites the limitation "according to the test methods described herein". There is insufficient antecedent basis for this limitation in the claim and it is unclear what test methods are encompassed by the language.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 32-49 and 57-58 are rejected under 35 U.S.C. 102(b) as being anticipated by **Te Raa et al. (WO0226370A1 – using US equivalent document US 2004/0096378 A1)**.

Regarding Claim 32, Te Raa et al. reference discloses a reactor comprising at least:

(a) a reaction area comprising at least one solid-state catalyst (**Abstract**); and  
(b) a coolable heat exchanger area comprising at least one housing at least partially accommodating an insert (**Abstract and Figures 1-7, numeral 50 – rod shape insert**),

wherein the reaction area and the coolable heat exchanger area are in fluid-communication (**Figure 1**).

Regarding Claim 33, Te Raa et al. reference discloses the reactor according to Claim 32, wherein the insert comprises at least one of the following properties determined according to the test methods described herein:

(A) a heat pressure quotient A1 at an empty pipe speed  $v$  of 0.485 m/s of greater than  $1.11 \text{ W/m}^2/\text{K}/(\text{mbar/m})$ ;

(B) a heat pressure quotient A2 at an empty pipe speed  $v$  of 0.728 m/s of greater than  $1.53 \text{ W/m}^2/\text{K}/(\text{mbar/m})$ ;

(C) a heat pressure quotient A3 at an empty pipe speed  $v$  of 0.970 m/s of greater than  $1.81 \text{ W/m}^2/\text{K}/(\text{mbar/m})$ ; or

(D) any combination of any of the preceding (**Page 3, Paragraph [0035] – 800-4000  $\text{W/m}^2/\text{K}$** ).

Regarding Claim 34, Te Raa et al. reference discloses the reactor according to Claim 32, wherein the insert comprises a plurality of elements (**Figures 2, 4, 5, 11 and 12**).

Regarding Claim 35, Te Raa et al. reference discloses the reactor according to Claim 32, wherein the insert comprise a degree of perforation of at least about 30 (**Page**

**3, Paragraph [0038] – 20 to 90% of the cross sectional internal surface area of the reactor tube).**

Regarding Claim 38, Te Raa et al. reference discloses the reactor according to Claim 34, wherein at least a part of the plurality of elements are arranged around a core **(Figures 2, 4, 11 and 12, numeral 51 – core).**

Regarding Claim 39, Te Raa et al. reference discloses the reactor according to Claim 38, wherein the core accommodates at least a part of the plurality of elements **(Figures 2, 4, 11 and 12, numeral 51 – core).**

Regarding Claim 40, Te Raa et al. reference discloses the reactor according to Claim 38, wherein the core comprises at least two longitudinal elements **(Figure 5 and Page 3, Paragraph [0039]).**

Regarding Claim 41, Te Raa et al. reference discloses the reactor according to Claim 40, wherein the at least two longitudinal elements are twisted around each other to form one or more windings **(Page 3, Paragraph [0043]).**

Regarding Claim 42, Te Raa et al. reference discloses the reactor according to Claim 41, wherein the at least one of the elements is accommodated in the one or more windings **(Page 3, Paragraph [0043]).**

Regarding Claim 43, Te Raa et al. reference discloses the reactor according to Claim 34, wherein the plurality of elements comprises a wire **(Page 3, Paragraph [0043] – wire mesh).**

Regarding Claim 44, Te Raa et al. reference discloses the reactor according to Claim 38 , wherein the core comprises a wire (**Page 3, Paragraph [0043] – wire mesh**).

Regarding Claims 45, Te Raa et al. reference discloses the reactor according to Claim 43, wherein the wire comprises a metal wire (**Te Raa et al – Page 4, Paragraph [0050]**).

Regarding Claim 46, Te Raa et al. reference discloses the reactor according to Claim 44, wherein the wire comprises a metal wire (**Te Raa et al – Page 4, Paragraph [0050]**).

Regarding Claim 47, Te Raa et al. reference discloses the reactor according to Claim 32, wherein the insert at an inner space cross-section of the housing substantially fills this inner space cross-section (**Figures 2, 4, 5, 11 and 12**).

Regarding Claim 48, Te Raa et al. reference discloses the reactor according to Claim 32, wherein the housing comprises a cylindrical inner space (**Figures 2, 4, 5, 11 and 12**).

Regarding Claim 49, Te Raa et al. reference discloses the reactor according to Claim 32, wherein the insert has a cylindrical form (**Figures 2, 4, 5, 11 and 12**).

Regarding Claim 50, Te Raa et al. reference discloses the reactor according to Claim 34, wherein at least a part of the plurality of elements contact an inner wall of the housing (**Figures 2, 4, and 5**).

Regarding Claim 51, Te Raa et al. reference discloses the reactor according to Claim 34, wherein at least a part of the plurality of elements comprise loops (**Page 3, Paragraph [0039] – rings**).

Regarding Claim 57, Te Raa et al. reference discloses a process for oxidation of a hydrocarbon comprising the steps of:

(a) communicating a hydrocarbon in a gaseous state to at least one solid-state catalyst of a reaction area of a reactor (**Page 4, Paragraphs [0052] & [0053]**);

(b) oxidizing a portion of the hydrocarbon to hydrocarbon product (**Page 4, Paragraphs [0052]**); and

(c) cooling at least a portion of the a hydrocarbon product by communicating the at least a portion of the a hydrocarbon product to a heat exchanger area comprising an insert (**Abstract**),

wherein the insert comprises at least one of the following properties determined according to the test methods described herein:

(A) a heat pressure quotient A1 at an empty pipe speed  $v$  of 0.485 m/s of greater than  $1.11 \text{ W/m}^2\text{K}/(\text{mbar/m})$ ;

(B) a heat pressure quotient A2 at an empty pipe speed  $v$  of 0.728 m/s of greater than  $1.53 \text{ W/m}^2\text{K}/(\text{mbar/m})$ ;

(C) a heat pressure quotient A3 at an empty pipe speed  $v$  of 0.970 m/s of greater than  $1.81 \text{ W/m}^2\text{K}/(\text{mbar/m})$ ; or

(D) any combination of any of the preceding (**Page 3, Paragraph [0035] – 800-4000  $\text{W/m}^2\text{K}$** ).



Regarding Claim 58, Te Raa et al. reference discloses the process according to Claim 57, wherein the hydrocarbon comprises an unsaturated hydrocarbon (**Page 4, Paragraph [0052] – ethylene**).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 36, 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Te Raa et al. (WO0226370A1 – using US equivalent document US 2004/0096378 A1) in view of Gough et al. (GB2097910 A).**

Regarding Claim 36, Te Raa et al. reference discloses the reactor according to Claim 34 except for the elements at least partially comprise a fiber-like material. Gough et al. reference discloses an insert made of filamentary material for placement within a heat exchange tube for improving the efficiency of the heat transfer of a fluid flowing through the tube (**Page 1, Lines 4-11 and Page 3, Lines 1-4**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the insert material as taught by Gough et al., since Gough et al. states at **Page 1, Lines 4-11** that such a modification would improve the efficiency of the heat transfer.

Regarding Claim 37, Te Raa et al. reference discloses the reactor according to Claim 34 except for at least two of the plurality of elements at least partially comprise a fiber-like material formed in one piece. Gough et al. reference discloses this insert (**Figure 1, numeral 13 and Page 3, Lines 1-4**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the insert material as taught by Gough et al., since Gough et al. states at **Page 1, Lines 4-11** that such a modification would improve the efficiency of the heat transfer.

Claims 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Te Raa et al. (WO0226370A1 – using US equivalent document US 2004/0096378 A1)**

Regarding Claim 54, Te Raa et al. reference discloses the reactor according to Claim 32 except for a part of the insert at least partially extends into the reaction area. Te Raa et al. discloses a bed of particulate catalyst material of alpha silver impregnated alpha alumina rings. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the solid catalyst rings as part of the insert since the insert of Te Raa et al. can comprise surface protrusions such as rings **(Figures 6 and 7).**

Regarding Claim 55, Te Raa et al. reference discloses the reactor according to Claim 54 except for the part of the insert that extends into the reaction area comprises a catalyst. Te Raa et al. discloses a bed of particulate catalyst material of alpha silver impregnated alpha alumina rings. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the solid catalyst rings as part of the insert since the insert of Te Raa et al. can comprise surface protrusions such as rings **(Figures 6 and 7).**

Regarding Claim 56, Te Raa et al. reference discloses the reactor according to Claim 32 except for the reaction area further comprises an additional insert comprising a catalyst. Te Raa et al. discloses a bed of particulate catalyst material of alpha silver impregnated alpha alumina rings. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the solid catalyst rings as part of the insert since the insert of Te Raa et al. can comprise surface protrusions such as rings **(Figures 6 and 7).**

Claims 52-53 and 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Te Raa et al. (WO0226370A1 – using US equivalent document US 2004/0096378 A1) in view of Tenten et al. (WO01/36364 using US equivalent document US Patent No, 6,740,779 B1)**

Regarding Claim 52, Te Raa et al. reference discloses the reactor according to Claim 32 except for comprising at least one additional reaction area in fluid-communication with the heat exchanger area. Tenten et al. reference discloses a single tube bundle reaction comprising a plurality of catalyst beds (**Column 2, Lines 46-53**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teaching of Te Raa et al. and Tenten et al. for two stage catalytic gas phase oxidation reaction, since Te Raa et al. states at **Page 2, Paragraph [0013]** that such a modification would promote the pre-heating and/or post cooling of the reaction gases in the upstream and/or downstream portion of multi-tubular reactors.

Regarding Claim 53, Te Raa et al. and Tenten et al. references disclose the reactor according to Claim 52, wherein the solid-state catalyst in the reaction area and a further catalyst in the additional reaction area are different (**Tenten et al. – Abstract**).

Regarding Claim 59, Te Raa et al. reference discloses the process according to Claim 57 including an epoxidation of alkenes. However, Te Raa et al. reference does not disclose that the hydrocarbon comprises propene. Tenten et al. reference discloses a process for two stage catalytic gas phase oxidation of propene to acrylic acid in a tube bundle reactor (**Column 2, Lines 46-53**). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the process of Te Raa

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et al. to oxidize propene to acrolein or acrylic acid, since Te Raa et al. states at **Page 2, Paragraph [0013]** that such a modification would promote the pre-heating and/or post cooling of the reaction gases in the upstream and/or downstream portion of multi-tubular reactors.

Regarding Claim 60, Te Raa et al. and Tenten et al. reference discloses the process according to Claim 59, wherein the oxidized hydrocarbon product comprises acrolein or acrylic acid (**Tenten et al. - Abstract**).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUY-TRAM NGUYEN whose telephone number is (571)270-3167. The examiner can normally be reached on MON- THURS: 6:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HTN  
7/14/09

/Walter D. Griffin/  
Supervisory Patent Examiner, Art Unit 1797